

# NASA TECH BRIEF

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## Automatic Soldering Machine

### The problem:

Tube joints that are soldered manually frequently leak because of imperfections created during the joining process. Overheating or underheating of the solder, misalignment of the tubing, entrapped gas bubbles, and accidental movement of the heating units can all cause imperfect joints.

### The solution:

A fully-automatic tube-joint soldering machine can be used to make leakproof joints in aluminum tubes of 3/16 to 2 in. (0.48 to 5.1 cm) in diameter.

### How it's done:

The soldering machine, shown in Figure 1, consists of a temperature-control unit, a timer, a heater transformer

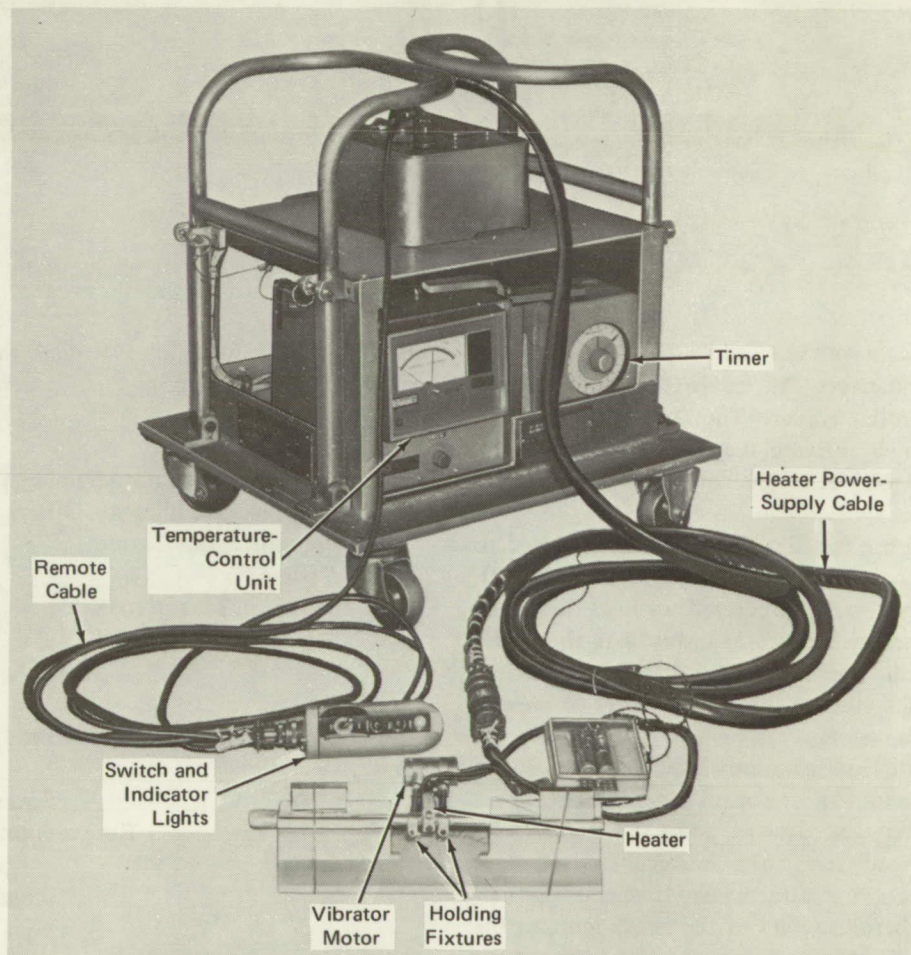


Figure 1. Automatic Soldering Machine

(continued overleaf)



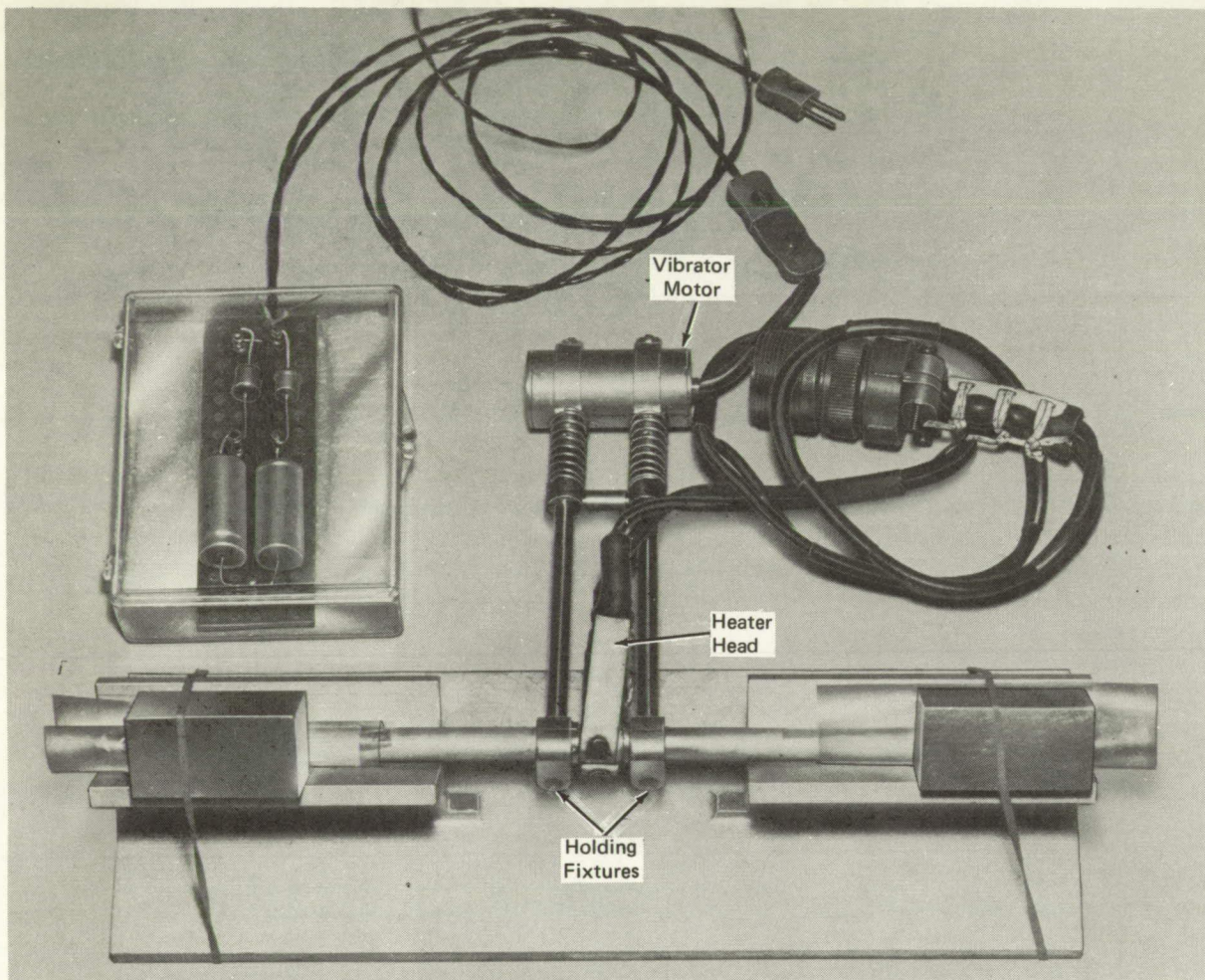


Figure 2. Heater Head

and heater head, a vibrator, and associated circuitry, controls, and indicators. All of these components are mounted on a rollaway cart. The temperature-control unit and the timer regulate the clip-on heater heads, which keeps the joint at a constant temperature for the required period of time.

The machine has two fixtures which are attached to the tubing, one on each side of the joint (see Figure 2). The fixtures serve several purposes: They hold the tubing in place, they act as barriers to insure that the solder alloy is kept in the coupling area and they are attached to a motor which vibrates the heated solder to prevent rosin or gas entrapment.

Three separate configurations have been developed for the heater head: (1) for normal construction, (2) for construction in congested areas, and (3) for reworking joints in congested areas. The heater heads all have quick disconnects for attachment to heater power-supply cable. Thermocouples in the heads monitor the union temperature, which is fed back to the temperature-control unit. The remote control cable has an on/off

switch and indicator lights that mark the beginning and end of the heating cycle.

#### Note:

Requests for further information may be directed to:  
Technology Utilization Officer  
Johnson Space Center  
Code AT3  
Houston, Texas 77058  
Reference: TSP74-10193

#### Patent status:

NASA has decided not to apply for a patent.

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